

WHAT IS CLAIMED IS

1. An apparatus for automatically and continuously forming envelopes (51) to contain filter bags (1) for an infusion product, the apparatus comprising means (60; 129, 131) for forming the envelopes, designed to make on a web (126) of packaging material moving along a predetermined feed path (174) a longitudinal fold line delimiting two adjacent flaps (127) defining an interposed opening through which the web (126) can be laterally accessed by the filter bags (1); manipulating means (123, 148, 128) designed to receive the filter bags (1) in succession, to turn them so that they lie in substantially the same plane as the web flaps (127) and to move the filter bags (1) along a feed path (62a, 62b, 62c) having at least one end section (62c) that is substantially centered relative to the web flaps (127), the filter bags (1) moving along this end section (62c) in the same direction as the paper web (126), the manipulating means being designed to release the filter bags (1) in such a way as to place them between the flaps (127) of the web (126).
2. The apparatus according to claim 1, wherein the means for manipulating the filter bags (1) comprise a first wheel (123) which rotates about a horizontal axis of rotation (124) and which is equipped with operating units (148) designed to retain the filter bags (1); to turn the placement plane of each about an axis (121)

radial to the first wheel (123) and to transport the filter bags (1) along a first, arc shaped section (62a) of their feed path; the manipulating means also comprising a second gripper wheel (128) peripherally associated with the first wheel (123), rotating in the opposite direction and tangential to the feed path (174) of the web of packaging material, the second gripper wheel (128) being designed to receive the filter bags (1) one after the other from the first wheel (123), to transport them along a second arc shaped section (62b) of their feed path, to place them between the flaps (127) of the web (126) and to release them onto the web (126) itself.

3. The machine according to claim 1 or 2, wherein the web (126) of packaging material has on it a layer of glue to be thermally activated, the means for forming the envelopes (51) including a heat-sealing station (129) where the web (126) of envelope material passing through with the filter bags (1) placed between its flaps (127) is sealed in such a way as to form a continuous flattened tube (130) divided into a succession of separate chambers, each accommodating a filter bag (1).

4. The machine according to claim 3, wherein the envelope forming means comprise a cutting unit (131) designed to cut the flattened tube (130) into successive lengths corresponding to the envelopes (51).

5. The apparatus according to any of the foregoing claims, wherein the filter bags (1) have containment chambers (2) each consisting of two contiguous pouches (3) located one after the other, the operating units (148) of the first wheel (123) being equipped with a unit (63) for folding the pouches (3) of the filter bags (1) and with a unit (58) for turning the filter bags (1), these two units being combined with each other, the folding unit (63) being designed to fold the containment chamber (2) until the pouches (3) are mutually superposed, and the turning unit (58) being designed to turn the filter bags (1) about their longitudinal axes (50) so as to rotate the plane in which each filter bag (1) lies relative to the axis of rotation (124) of the first revolving wheel (123).
6. The apparatus according to claim 5, wherein the folding unit (63) comprises a device (105) for clamping the infusion product containment chamber (2) of the filter bag (1) and a system of grippers (106), pivotably mounted around horizontal axes (110), the clamping device (105) being designed to hold the containment chamber (2) by the sealed join (5) connecting its two contiguous pouches (3), the system of grippers (106) being designed to fold the containment chamber (2) pouches (3), initially lying flat, one after the other, onto each other until the pouches (3) are mutually superposed.

7. The apparatus according to claim 6, wherein the clamping device (105), while it holds the filter bag (1), also makes a fold in the bottom sealed join (5) which connects the pouches (3).
8. The apparatus according to claim 7, wherein the clamping and folding device (105) comprises a pair of folding blades (107) and a folding counterblade (108) on opposite sides of the filter bag (1) and pressing against each other in such a way as to make a fold in the bottom sealed join (5) between two pouches (3); pressers (109) being provided, one on each side of the folding counterblade (108), which elastically oppose each other to allow the folding blades (107) to pass freely between them and the counterblade (108) when the folding blades (107) and the counterblade (108) move towards each other, and, instead, to securely hold the bottom fold in the filter bag (1) by pressing it against the counterblade (108) when the folding blades (107) move away from the counterblade (108).
9. The apparatus according to claim 8, wherein the folding blades (107) and the counterblade (108) are mounted on a revolving wheel (151) and on the first gripper wheel (123), which are coupled in rolling relationship of relative primitive circles (152, 153) in such a way that the folding blades (107) and the counterblade (108) mesh with each other.

10. The apparatus according to claim 8, wherein the pressers (109) are mounted in such a way that they can swing about respective horizontal axes (110).
11. The apparatus according to claim 6, wherein each gripper (106) includes a pair of levers (116) which are rotatably mounted on fixed pins (117), the levers (116) opening and closing in such a way as to make the pouches (3) of the filter bag (1) rotate about the common sealed join (5) until they are mutually superposed.
12. The apparatus according to claim 11, wherein the levers (116) are mounted crosswise.
13. The apparatus according to claim 11, wherein the levers (116) have specially shaped ends (118) designed to interact with each other and to grip the filter bag (1) close to its top end (15) as soon as the pouches (3) of the filter bag (1) are folded onto each other.
14. The apparatus according to any of the foregoing claims from 5 to 13, wherein the folding unit (63) comprises a device (111) for actuating the levers (116) equipped with a rack (113) mounted on a slidable rod (112) and rotatable pinions (114) which mesh with the rack (113) and which are attached to the levers (116), the sliding motion imparted on the rod (112) by an actuating element (115) in a first direction of rotation of the levers (116) causing the filter bag (1) to be folded in such a way as to superpose the

10 pouches (3) of the containment chamber (2), and to be held by its
top end (15), the sliding motion in the opposite direction placing
the levers (116) in a condition in which they are ready to receive a
filter bag (1) with the containment chamber (2) pouches (3)
positioned in line.

15. The apparatus according to claim 14, wherein the actuating
element (115) comprises a cam (155) associated with the slidable
rod (112).

16. The apparatus according to claim 5, wherein the turning unit (58)
comprises a head (149) that revolves about an axis (121) radial to
the first gripper mounting wheel (123), means (120) for rotationally
actuating the head (149) in synchrony with the rotation of the first
5 wheel (123) causing the folding unit (58) to rotate in such a way as
to turn the filter bag (1) so that the plane which it finally lies in is
transversal to the axis of rotation (124) of the first wheel (123).

17. The apparatus according to claim 16, wherein the means (120) for
rotationally actuating the head (149) comprise linkages (122)
driven by mechanical cams in synchrony with the rotation of the
first gripper wheel (123).

18. The apparatus according to claim 2, comprising a unit (59), which
is associated with the edge of the first wheel (123) and which is

designed to trim the top end (15) of the filter bag (1) projecting radially from the edge of the first wheel (123).

19. The apparatus according to claim 18, wherein the second gripper wheel (128) is designed to grip the filter bags (1) by their top ends (15) projecting radially from the edge of the first wheel (123).
20. The apparatus according to claim 2, comprising a unit (173), which is associated with the edge of the first wheel (123) and which is designed to seal the top end (15) of the filter bag (1) projecting radially from the edge of the first wheel (123).